

for supplying sense current to the spin valve film, in which the spin valve film comprises one nonmagnetic spacer layer and two magnetic layers as separated by the nonmagnetic spacer layer existing therebetween, and this is characterized in that, of at least two magnetic layers, one of which the magnetization direction varies, depending on the applied magnetic field, is oriented to fcc(111), and that the d(111) lattice spacing is between 0.2055 and 0.2035 nanometers.

In a seventh aspect, the present invention provides a magnetoresistance effect device comprising a giant magnetoresistance effect film and a pair of electrodes for supplying current to the giant magnetoresistance effect film, in which the giant magnetoresistance effect film comprises at least a pair of a pinned magnetic layer and a free layer as separated by a nonmagnetic spacer layer disposed therebetween, and an antiferromagnetic layer as laminated on the pinned magnetic layer for pinning the magnetization of the pinned magnetic layer, and which is characterized in that the pinned magnetic layer comprises a pair of ferromagnetic layers, a ferromagnetic layer A as disposed adjacent to the nonmagnetic spacer layer and a ferromagnetic layer B as disposed adjacent to the antiferromagnetic layer, that those ferromagnetic layers A and B are antiferromagnetically coupled to each other via an antiferromagnetically coupling layer existing therebetween, and that the antiferromagnetic layer has a

thickness of at most 20 nanometers and has a magnetic coupling coefficient, J , for the ferromagnetic layer B of at least 0.02 erg/cm^2 at 200°C .

In an eighth aspect, the present invention provides a magnetoresistance effect element comprising a giant magnetoresistance effect film and a pair of electrodes for supplying current to the giant magnetoresistance effect film, in which the giant magnetoresistance effect film comprises at least a pair of a pinned magnetic layer and a free layer as separated by a nonmagnetic spacer layer disposed therebetween, and an antiferromagnetic layer as laminated on the pinned magnetic layer for pinning the magnetization of the pinned magnetic layer, the pinned magnetic layer comprises a pair of ferromagnetic layers, a ferromagnetic layer A as disposed adjacent to the nonmagnetic spacer layer and a ferromagnetic layer B as disposed adjacent to the antiferromagnetic layer, those ferromagnetic layers A and B are antiferromagnetically coupled to each other via an antiferromagnetically coupling layer existing therebetween, and the antiferromagnetic layer has a thickness of at most 20 nanometers and contains at least any one of $Z_x\text{Mn}_{1-x}$ (where Z is at least one selected from Ir, Rh, Ru, Pt, Pd, Co and Ni, and $0 < x < 0.4$), $Z_x\text{Mn}_{1-x}$ (where Z is at least one selected from Pt, Pd and Ni, and $0.4 \leq x \leq 0.7$), or $Z_x\text{Cr}_{1-x}$ (where Z is at least one selected from Mn, Al, Pt, Pd, Cu, Au, Ag, Rh, Ir and Ru, and $0 < x < 1$).

The magnetic head and the magnetic recording/reproducing system of the invention incorporate the magnetoresistance effect device of the invention noted above. Specifically, the magnetic head of the invention is characterized by comprising a lower magnetic shield layer, a magnetoresistance effect device of the invention such as that noted above, which is formed on the lower magnetic shield layer via a lower reproducing magnetic gap therebetween, and an upper magnetic shield layer as formed on the magnetoresistance effect device via an upper reproducing magnetic gap therebetween.

The magnetic head for separated recording/reproducing of the invention is provided with a reproducing head that comprises a lower magnetic shield layer, a magnetoresistance effect device of the invention such as that noted above, which is formed on the lower magnetic shield layer via a lower reproducing magnetic gap therebetween, and an upper magnetic shield layer as formed on the magnetoresistance effect device via an upper reproducing magnetic gap therebetween, and with a recording head that comprises a lower magnetic pole which is common to the upper magnetic shield layer, a recording magnetic gap as formed on the lower magnetic pole, and an upper magnetic pole as formed on the recording magnetic gap.

The magnetic head assembly of the invention is characterized by comprising a head slider having the separated recording/reproducing magnetic head of the invention noted